CLAIMS:

1. A temperature sensing method in which pulses of optical radiation are launched by a laser diode into an optical fibre and optical radiation backscattered from the fibre is detected, the method comprising passing the backscattered radiation through a single optical filter whereby a first signal is recorded at the anti-Stokes Raman wavelength from a signal launched by the laser diode in a laser mode and a second signal is recorded at the Rayleigh wavelength from a signal launched by the laser diode in a light emitting diode mode, and a comparison is made of the two signals to provide an indication of temperature.

2. The temperature sensing method according to claim 1 wherein the comparison produces the quotient of the anti-Stokes Raman wavelength divided by the Rayleigh wavelength.

3. The temperature sensing method of either claim 1 or claim 2 comprising using a photomultiplier tube to count photons passing through the single optical filter.

4. The temperature sensing method according to claim 3 wherein the photon count provides an indication of temperature and the arrival time of the signals allows identification of the position of that temperature along the length of the optical fibre cable.

5. The temperature sensing method according to claim 4 wherein the laser diode, the single optical filter and the photomultiplier tube are coupled to the optical fibre via connectors and at least one temperature sensor is positioned downstream of the connectors to correct error signals emanating from the connectors.

6. The temperature sensing method according to claim 5 wherein a thermistor or thermocouple is located down the optical fibre to provide a temperature indication and allow for the influence of connector error.

7. The temperature sensing method according to any one of claims 3 to 6, comprising stabilising and controlling the temperature of the laser diode and photomultiplier tube.

8. The temperature sensing method according to claim 7 wherein a short reference section of the optical fibre is held at constant temperature in a temperature controlled chamber.

9. The temperature sensing method according to claim 8 comprising providing two distinct controlled temperature regions and monitoring the temperatures through use of sensors in each region, and monitoring the effect of the temperature controlled region on the accumulated photon count.

10. The temperature sensing method as claimed in any one of the preceding claims wherein the pulses of optical radiation are transmitted at a wavelength between the ultra-violet and infrared spectrum.

11. The temperature sensing method as claimed in claim 10 wherein the wavelength is in the range 775-800nm.

12. The temperature sensing method as claimed in any one of the preceding claims wherein the laser diode is selected to have transmission power of less than 1W.

13. A distributed temperature sensor comprising a laser diode adapted to launch pulses of optical radiation into an optical fibre arranged to be located in thermal contact with an object, and a single optical filter to detect optical radiation backscattered from the fibre, the distributed temperature sensor being adapted to operate according to the method of either claim 1 or 2.

14. The distributed temperature sensor according to claim 13 wherein the single optical filter is coupled to a photomultiplier tube.

15. The distributed temperature sensor according to claim 14 wherein the laser diode, the single optical filter and the photomultiplier tube are coupled to the optical fibre via connectors and at least one temperature sensor is positioned downstream of the connectors to isolate error signals emanating from the connectors.

16. The distributed temperature sensor according to any one of claims

13 to 15 comprising control means to stabilise and control the temperature of the laser diode and photomultiplier tube.

17. The distributed temperature sensor according to claim 16 wherein sensors are positioned in two distinct temperature regions to monitor the temperatures to monitor the effect of the temperature calibration region on the photon count.

18. The distributed temperature sensor according to any one of claims 13 to 17 wherein the laser diode has a transmission power of less than 1W.